

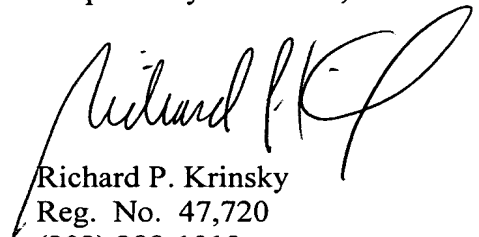
REMARKS

This Preliminary Amendment is to clarify portions of the Application, including the Specification and Claims, to add a new claim, to add a replacement Abstract of the Disclosure, and to amend the Drawings. Also included are a Substitute Specification, a marked-up copy of the Substitute Specification showing the changes made and an English-translation of the International Application. No new matter has been added.

The Application is now in condition for allowance, and such is respectfully requested.

It is respectfully requested that, if necessary to effect a timely response, this paper be considered as a Petition for an Extension of Time sufficient to effect a timely response and shortages in other fees, be charged, or any overpayment in fees be credited, to the Account of Barnes & Thornburg LLP, Deposit Account No. 02-1010 (677/44187).

Respectfully submitted,



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OF SUBSTITUTE SPECIFICATION

FILTERING DEVICE

BACKGROUND AND SUMMARY

[0001] The ~~invention~~ present disclosure relates to a filtering device ~~according to the~~
~~preamble of Claim 1~~ having a container with an inlet. At least one spindle is arranged in
the device. A plurality of mutually axially offset diaphragm plates are mounted on the
spindles.

[0002] Filtering devices of this type are known ~~per se; for~~. For example, from the field of
separators ~~where it is known to place axially mutually offset diaphragm plates on the inlet~~
~~pipe.~~

[0003] This arrangement has been successful ~~per se~~. Nevertheless, there is demand for a
filtering device with filtering disks, particularly diaphragm disks, which permits or has a
good filtering effect, while the construction is particularly simple, and preferably has a low
energy consumption.

[0004] ~~The implementation of such a filtering device is an object of the invention.~~

[0005] ~~The invention achieves this task by means of the object of Claim 1.~~

~~006]~~**[0004]** Accordingly, more than two of the spindles provided with the filtering plates
(particularly diaphragm plates) is distributed in the container, and the spindles can be
rotated relative to the container. The present disclosure addresses the above-referenced
need by providing for a filtering device that includes a container having an inlet and two
or more spindles arranged in the device. Further included are at least two mutually axially
offset diaphragm plates mounted on each of the two or more spindles. The two or more
spindles are distributed in the container and rotatable relative to the container.

~~007]~~**[0005]** The arrangement filtering device of the present disclosure is characterized by a

simple construction with a stationary non-rotatable container and a low energy requirement while and the filtering effect is good.

~~008~~[0006] _____ The diameter of the diaphragm plate preferably is disks or plates may be so large or dimensioned such that the diaphragm plates of adjacent spindles overlap in their outer-circumference area, the. The diaphragm plates of adjacent spindles correspondingly being are arranged axially offset with respect to one another.

~~009~~[0007] _____ The overlapping area especially has the advantage of provides a particularly low risk of the formation of a covering layer of solids on the diaphragm disks and thereby increases a sanitary suitability or design.

~~010~~[0008] _____ The inflow preferably leads tangentially into the container which is cylindrical at least in sections, which. This results in a preliminary separation because of the centrifugal effect and in a simple possibility of being the sole or additional drive of the diaphragm plates with the spindles by the circulating liquid.

~~011~~[0009] _____ A plurality of spindles is preferably may be uniformly distributed on a circle of a radius "r" in the container.

~~12~~[00010] _____ According to another advantageous variant embodiment, the number of spindles is even so that a largely symmetrical arrangement is implemented in which the diaphragm plates of all spindles can overlap.

~~13~~[00011] _____ For implementing a sufficient processing capacity, it is may be expedient to arrange a plurality of diaphragm plates, [(~~1~~) for example, ten or more(~~1~~)] on each spindle.

~~14~~[00012] _____ The container is preferably may be hydrocyclonically shaped. In a particularly advantageous favorable manner, this achieves a preliminary separation of solid particles which results in a minimized action of solids upon the diaphragm plates. As a result of the turbulence of the spindles and the diaphragm plates toward the outside, [-] or away from the diaphragms [-] of the diaphragm plates, the solids retained by the diaphragm surfaces are then necessarily carried away downward by gravity.

~~15~~[00013] ~~Advantageous further developments are contained in the subclaims.~~

~~16~~[00014] ~~In the following, the invention will be described in detail with respect to the drawing by means of embodiments. Other aspects of the present disclosure will become apparent from the following descriptions when considered in conjunction with the accompanying drawings.~~

BRIEF DESCRIPTION OF THE DRAWINGS

~~17~~[00015] ~~Figure 1 is a an elevational sectional view of an embodiment of a filtering device; and, according to the present disclosure.~~

~~18~~[00016] ~~Figure 2 is another a top, partial sectional view of the filtering device of Figure 1; which is perpendicular to Figure 1.~~

DETAILED DESCRIPTION

~~19~~[00017] ~~Figure 1 illustrates a filtering device 1 with a stationary non-rotatable container 2 which is hydrocyclonically shaped. A cylindrical section 3 of the container 2 with has a center axis M here-oriented perpendicularly or vertically and with has a tangentially oriented inlet 4. Cylindrical section 3 is adjoined in the a downward direction by a tapering conical section 5 which leads into an outlet 6 in the a downward direction.~~

~~20~~[00018] ~~Because of the tangential inlet 4, a motor drive can be eliminated if the product inflow speed is sufficient. That is because the a forming twist drives the diaphragm plates or disks 11 as a result of the developing friction. However, for supporting the a rotating movement, a drive (shown in phantom in Figure 2) can optionally be utilized which has a motor with a belt transmission (not shown here).~~

~~21~~[00019] ~~The container 2 or its cylindrical section 3 is closed on its top side by means of a type of lid which simultaneously is used as a bearing housing 7 for several spindles 8 which in each case. The spindles 8 project from above into the container 2 and which are oriented parallel to one another.~~

~~22~~[00020] ~~Here, the The spindles 8 project into the container 2 to the start of the conical~~

section 5 into the container 2. ~~They.~~ The spindles 8 are, for example, each rotatably disposed by means of two bearings 9 in bores 10 of the bearing housing 6-7 in an overmounted manner. The overmounting of the ~~here advantageously~~ vertically oriented spindles 11-8 has the advantage of a particularly sanitary product space in the container 2 and the additional advantage of additionally has reduced component and sealing expenditures. If necessary, a sieve sheet 17 can be inserted at the an end facing away from the bearing housing 7. The sieve sheet 17 can be used for the support and friction damping of the spindles 8, which sieve sheet 17 is penetrated by the spindles 8. This ~~measure arrangement~~ has a positive effect particularly when there is a passing through a critical rotational speed. The bearing 9 is protected from a product overflow by means of leakage drains 16.

23][00021] ~~Particularly advantageously, an~~ An even number of bores 10 with the spindles 8 ~~[[~~ here, ~~for~~ may be included. For example, as shown in Figure 2, a total of six spindles 8 ~~[[~~ are uniformly distributed on a circle having a radius r , ~~the.~~ The center axis M of the container 2 ~~extending~~ extends through its ~~the~~ center of the cylindrical section 3.

24][00022] At least two or more (~~for example, more than ten~~) or preferably, for example, more than ten and even a large number of diaphragm plates 11 ~~are~~ may be arranged on each of the spindles 8 in its ~~an~~ area of the spindles 8 projecting into the container 2, ~~which.~~ The diaphragm plates 11 ~~here have~~ are shown, for example, having a round construction and are oriented concentrically with respect to the spindles 8.

25][00023] The diaphragm plates 11 ~~preferably consist of~~ may include a ceramic material. In addition, they ~~preferably~~ may have a two-layer construction, in which case an annulus (~~not visible here~~) is ~~(not shown)~~ may be constructed between the two upper and lower ceramic layers, ~~which in each case.~~ The annulus leads to the an interior toward the spindles 8 into ~~in each case~~ at least one duct 12 which, in turn, ~~each lead~~ leads into discharge ducts 13 leading out vertically or perpendicularly to the diaphragm plates 11 toward the a top of the

device 1 in the spindles 8. These discharge ducts 13, in turn, lead out at their upper ends into a common ~~(ring)~~ring-type discharge bore 14 in the bearing housing 6, ~~which~~7. The discharge bore 14 is provided with an outlet 15 for carrying away ~~the liquid~~ from the filtering device 1.

26][00024] The diaphragm plates 11 have a width “b” in the axial direction. ~~In this case,~~
~~the~~The axial spacing “a” of the diaphragm plates 11 meets ~~the a~~ requirement that $a > b$; ~~that~~.
That is, the diaphragm plates 11 are axially on the spindles 8 each spaced away from one another such that ~~the an~~ edge of another diaphragm plate 11 can be slid in between them at ~~the an~~ outer circumference.

27][00025] ~~This is utilized as follows.~~As illustrated in Figure 2, ~~the a~~ diameter “d” of the diaphragm plates 11 is, in each case, selected to be so large that the diaphragm plates 11 of adjacent spindles 8 overlap one another in their outer circumference area. For this purpose, the diaphragm plates 11 on adjacent spindles 8 have to be arranged correspondingly axially offset with respect to one another.

28][00026] ~~This~~The arrangement described above in Figure 2 has the following function~~[[÷]]~~.

29][00027] A free-flowing substance to be filtered is guided through the tangential inlet 4 into the filtering device 1 or its container 2. The inflowing liquid takes along the diaphragm plates 11 and in this manner causes each of the spindles 8 to rotate.

30][00028] As a result of the hydrocyclonical shaping of the container 2, a preliminary separation is achieved which leads to a minimized action of solids upon the diaphragm plates 11.

34][00029] At the diaphragm disks 11 ~~[[-]]~~, particularly in the overlapping area of the diaphragm disks or plates 11-~~[[-]]~~, additional solids are separated from the substance to be filtered.

32][00030] ~~The~~A filtered liquid phase flows through ~~the diaphragms~~ of the diaphragm disks 11 into their annulus and from there through the ducts 12 as well as through the discharge

ducts 13 and the discharge bore 14 and the outlet 15 to the outside.

33**[00031]** _____ The solids retained by the diaphragm surfaces of ~~the~~ diaphragm plates 11 are thrown by ~~the~~ turbulence toward the outside away from the diaphragm plates 11 and is then discharged downward through the outlet 6.

[00032] _____ Although the present disclosure has been described and illustrated in detail, it is to be clearly understood that this is done by way of illustration and example only and is not to be taken by way of limitation. The scope of the present disclosure is to be limited only by the terms of the appended claims.

Reference Numbers

Filtration device	1
container	2
cylindrical section	3
tangential inlet	4
conical section	5
outlet	6
bearing housing	7
spindles	8
bearing	9
bores	10
diaphragm plates	11
duct	12
discharge ducts	13
discharge bore	14
outlet	15
leakage drains	16
sieve sheet	17
center axis	M
spacing (or distance)	a
width	b

WO 2004/089519 ————— PCT/EP2004/002482

CLAIMS WE CLAIM:

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

1. (Currently Amended) ~~Filtering device (1) having a container (2) with an inlet, in which at least one spindle (8) is arranged on which axially mutually offset filtering plates, particularly diaphragm plates (11), are placed, characterized in that more than two of the spindles (8) provided with the filtering plates (11) are distributed in the container (2), and in that the spindles (8) are rotatable relative to the container (2).~~ A filtering device, comprising:

a container having an inlet;

two or more spindles arranged in the device;

at least two mutually axially offset diaphragm plates mounted on each of the two or more spindles; and

wherein the two or more spindles are distributed in the container and rotatable relative to the container.

2. (Currently Amended) ~~Filtering~~ The filtering device according to Claim 1, ~~characterized in that the~~ further including inlet (4) ~~that~~ that leads tangentially into a cylindrical section of the container.

3. (Currently Amended) ~~Filtering~~ The filtering device according to Claim 1 or 2, ~~characterized in that a plurality of spindles (8), wherein the two or more spindles are~~

uniformly distributed in the container on a circle having a radius "r" ~~in the container (2).~~

4. (Currently Amended) ~~Filtering~~ The filtering device according to ~~one of the preceding claims, characterized in that~~ Claim 1, wherein the two or more spindles (8) are vertically oriented.

5. (Currently Amended) ~~Filtering~~ The filtering device according to ~~one of the preceding claims, characterized in that~~ Claim 1, wherein the number of spindles (8) is two or more spindles include an even number of spindles.

6. (Currently Amended) ~~Filtering~~ The filtering device according to ~~one of the preceding claims, characterized in that a large number of filtering plates (11) are~~ Claim 1, wherein the at least two mutually axially offset diaphragm plates include more than ten mutually offset diaphragm plates arranged on each of the two or more spindle (8) spindles.

7. (Currently Amended) ~~Filtering~~ The filtering device according to ~~one of the preceding claims, characterized in that~~ Claim 1, wherein the container (2) has a hydrocyclonical shape.

8. (Currently Amended) ~~Filtering~~ The filtering device according to ~~one of the preceding claims, characterized in that~~ Claim 1, wherein the container (2) has the a cylindrical section (3), and a tapering conical section (5) which leads into an outlet (6) for a solids phase.

9. (Currently Amended) ~~Filtering~~ The filtering device according to ~~one of the preceding claims, characterized in that~~ Claim 1, wherein the container (2) is stationary or and

non-rotatable.

10. (Currently Amended) ~~Filtering~~ The filtering device according to one of the preceding claims, characterized in that the Claim 1, wherein a diameter of the at least two mutually axially offset diaphragm plates (11) is so large dimensioned such that the at least two mutually axially offset diaphragm plates (11) of adjacent spindles (8) overlap in their outer circumference area, the at least two mutually axially offset diaphragm plates (11) of adjacent spindles (8) being arranged in a correspondingly axially mutually offset manner.

11. (Currently Amended) ~~Filtering~~ The filtering device according to one of the preceding claims, characterized in that Claim 1, wherein the container (2) is closed by means of a lid, which lid simultaneously serves as a bearing housing (7) for the two or more spindles (8) which spindles project in a mutually parallel manner in each case from above into the container (2).

12. (Currently Amended) ~~Filtering~~ The filtering device according to one of the preceding claims, characterized in that Claim 11, wherein the two or more spindles (8) are each rotatably disposed by means of bearings (9) in bores (10) of the bearing housing (7).

13. (Currently Amended) ~~Filtering~~ The filtering device according to one of the preceding claims, characterized in that Claim 11, wherein the two or more spindles (8) are overmounted in the bearing housing (7).

14. (Currently Amended) ~~Filtering~~ The filtering device according to one of the preceding claims, characterized in that Claim 12, wherein the bearings (9) are protected from a product overflow by means of leakage drains (16).

15. (Currently Amended) ~~Filtering-~~The filtering device according to one of the preceding claims, characterized in thatClaim 1, wherein the at least two mutually axially offset diaphragm plates (11) consist ofinclude a ceramic material.

16. (Currently Amended) ~~Filtering-~~The filtering device according to one of the preceding claims, characterized in thatClaim 15, wherein the at least two mutually axially offset diaphragm plates (11) have a two-layer constructioninclude an upper and lower layer, and, an annulus ~~being~~is constructed between the two upper and lower ceramic layers, which annulus leads toward ~~the~~an interior of the device into discharge ducts (13) extending in the two or more spindles.

17. (Currently Amended) ~~Filtering-~~The filtering device according to one of the preceding claims, characterized in thatClaim 16, wherein the discharge ducts (13) lead from the two or more spindles (8) into a common discharge bore (14) in thea bearing housing (11).

18. (Currently Amended) ~~Filtering-~~The filtering device according to one of the preceding claims, characterized in thatClaim 1, wherein the at least two mutually axially offset diaphragm plates (11) have a thickness "b" in the axial direction, and in that the at least two mutually axially offset diaphragm plates are separated by an axial spacing "a", between the diaphragm plates (11) on each spindle (8) meets the requirement $a > b$ such that axial spacing "a" is greater than thickness "b".

19. (Currently Amended) ~~Filtering-~~The filtering device according to one of the preceding claims, characterized in thatClaim 1, wherein the two or more spindles (9) are rotatable by~~means of~~a drive.

20. (New) The filtering device of Claim 3, wherein the two or more spindles are vertically oriented.

